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Recreational effects on riparian areas

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Abstract

Historically, riparian areas have been used by people as a source of food and water, as travel corridors, and as recreational areas. Only recently the recreational effects of people on riparian zones have been actively considered. The primary effects associated with recreation are soil compaction, vegetation change, erosion, and waste. Unmanaged recreational use has effects similar to those of other chronic disturbances associated with riparian areas. Generally, recreational-management strategies must include two approaches. The first is to direct people away from the most sensitive areas to those areas capable of withstanding recreational effects. The second approach is to provide educational opportunities to recreational users, allowing them to understand the effects of their activities and how they can be alleviated.

INTRODUCTION

Riparian areas benefit everything from vegetation to wildlife to people. People are attracted to riparian areas because of what is offered: water, food (primarily the wildlife and fish found in the riparian areas), shade, easy travel corridors, and aesthetics. Historically, riparian areas were used for encampments by pioneers as well as by Native Americans throughout the West. People still rely on the resources in riparian areas in the West for survival but have developed another use that many argue is also needed for survival—recreation. This paper will discuss various riparian ecosystems, historical recreational use, and alternatives for management to reduce recreational effects on riparian ecosystems.

RIPARIAN ECOSYSTEMS

The dominant feature of riparian systems is the presence of water. Increased water relative to surrounding uplands provides the habitat for the unique vegetation that occurs in riparian ecosystems. The water and unique vegetation, in turn, provide habitat and food for wildlife and fish. The presence of water and shading vegetation, along with the associated fish and wildlife, attracts people to riparian ecosystems for recreation. The sound of water flowing through the channel and of birds singing, as well as the typically cooler temperatures, makes these areas highly desirable recreational sites. There is, however, a tremendous effect on riparian areas throughout the West from recreational use.

Riparian areas vary greatly according to their geomorphic and associated biotic characteristics.[1] Riparian types range from dry desert riparian ecosystems that occur as narrow bands along stream channels to midelevation broad meadows that are frequently flooded to high-elevation gravelly sites with a few scattered willows (*Salix* spp.).

The effects of various users are different on each type of riparian area. Those portions of riparian zones formed on fine sediment deposits (those high in silt and clay) are more susceptible to soil compaction and vegetation loss than those reaches in gravelly and rocky material. The coarse-textured sediments (those high in sand) can often result in highly erosive stream banks.

HISTORICAL RECREATION

There are numerous recreational uses associated with riparian ecosystems, the most common being camping, fishing, boating, hunting, trail packing, mountain biking, and viewing birds and wildlife. Camping has a tremendous effect because of the time people (and often their recreational vehicles and horses) spend in the riparian areas. Recreational management has often perpetuated these problems. Some dramatic examples of the effects of recreation on riparian ecosystems can be seen in the Greater Yellowstone ecosystem. Recreational use in Yellowstone Park reaches approximately 9 million recreational visitor days (RVDs) per year. The developed recreational facilities can handle about 90,000 visitors per day; undeveloped areas handle about the same number. Many of these developed facilities on both the National Forest- and the National Park Service-managed lands are located in riparian areas. Heavy use results in soil compaction and vegetation trampling. Soil compaction reduces water infiltration and has altered plant communities in many areas. Recreational activities often result in erosion of stream banks caused by trails adjacent to and across channels. This erosion increases stream width and sedimentation while reducing water depth, shading, and habitat diversity.

Some recreational activities affect the riparian areas even though they occur on the uplands outside of the riparian zone. Activities that result in increased erosion that ends up in the riparian zone affect those systems. Unmanaged recreation is no different than other types of unmanaged chronic disturbances in the riparian zones.[2] Secondary effects include the issues of litter and human waste associated with recreational use, which is a growing problem.

MANAGEMENT ALTERNATIVES

Various opportunities are available to work with the recreationists to mitigate and reduce various types of recreational effects on riparian ecosystems. Projects in Mill Creek and in Big Cottonwood Canyons in the Salt Lake Ranger District of the Wasatch-Cache National Forest provide good examples of improving existing conditions and of efforts to mitigate existing effects. These efforts integrated watershed, fisheries, and recreational management.

The first step in these projects was the identification of how many riparian areas were affected by recreation and to what degree the effect was occurring. The second step was to evaluate the effectiveness of existing mitigation procedures and to determine what management techniques could be employed and what the cost would be to make changes. Finally, a schedule was developed to make sure the improvements were being accomplished and that monitoring was done to ensure that activities were actually improving the riparian ecosystems' conditions.

Identification

The first step (locating critical areas) can be done in the office. Field data are collected to provide an idea of existing conditions relative to the desired future condition. At Box Elder Picnic Area and at Redmond Campground in the Salt Lake Ranger District of the Wasatch-Cache National Forest, a loss of fish habitat and barriers to fish passage were found. Stream banks were laid back rather than vertical or overhanging, tree roots were exposed, and most of the stream reaches were less than 50 percent vegetated. Rock dams built in the channel by recreationists created barriers to fish. Outside the Redmond Campground, stream banks were 100 percent vegetated and considered stable.

Effectiveness and Costs

Several management techniques are available to improve conditions in riparian areas that have been negatively affected by human recreational use. The

[1]See Swanson, this volume.

[2]See Krueger ("Agriculture and Riparian Areas") and Kay, this volume.

effectiveness and cost of managing recreation in riparian areas varies depending on the site and associated objectives. The management techniques used in managing recreation in these areas often have high short-term costs, which may limit the implementation of a plan. The most drastic measure to improve conditions is to close sites to recreational use, but a major goal of the Wasatch-Cache National Forest and most national forests is to maintain viable recreational use and positive recreational experiences for the majority of people. Closing an area often has the lowest direct costs, but indirect costs associated with the conflicts created by the closing are often high. However, closing should be considered as an option, at least for a short period of time. If an educational program accompanies the closing, conflicts can be reduced.

Techniques using vegetation as a management tool to direct human traffic flows tend to have lower costs but often cannot withstand heavy recreational use, particularly in riparian areas dominated by fine-textured soils. Using structures to direct human flow has a high short-term cost but offers the greatest protection to riparian areas from recreational use and results in lower long-term expenditures. Structures placed in the stream to direct water flow also have high costs and a high failure rate because of flood events. Placing structures in the stream should be used with caution. Other techniques to be considered are (1) the building of structures both in the stream to direct water flow and on the bank to direct human traffic flow and (2) vegetation management. The technique selected is often determined by the money available and by the time frame.

Another technique is to build walkways that direct the movement of people in recreational areas and that reduce the effects on the system. Along the walkways, the placement of benches and interpretive signs also helps direct movement of people. The movement of people away from the more susceptible stream banks helps stabilize the banks, reducing erosion and providing cover to trap sediments during flood periods.

Another management technique is to get the public involved. When people are involved, they have an interest in the project and in its outcome; and with education, they understand what the goals are for the area and what can be done to provide a quality recreational experience while maintaining a quality environment. With an educational program that teaches individuals and groups about the effects of their activities on riparian systems and what they can do to reduce those effects, a positive change can be implemented. This technique can have greater impacts beyond the immediate impact zone if behavior is affected.

Schedule

Once the techniques have been selected to meet the management objectives, the final step of the plan is to develop a schedule. Cost restrictions often make scheduling critical. The schedule should outline the sequence in which each component of the plan will be completed and who will be responsible. This schedule should include a monitoring plan to ensure that the objectives are being met. In the example of the Box Elder Picnic Area and the Redmond Campground, structural improvements in the stream were added, while attempts were made to reduce trampling damage on stream banks. The movement of people was directed to selected areas through the placement of rocks and woody vegetation on the stream and through the "hardening" of those areas to reduce the disturbance caused by people. To accomplish this, tree root wads were placed in the stream to add structure to the stream channel, with the trunks imbedded in the bank. Willows and other shrubs and trees were then planted to help stabilize the sites and to buffer against high-flood periods. These techniques inhibited the movement of people to the streams and directed them to specific areas. On the stream bank, rock stair steps to the stream were installed. With the aid of a landscape architect and a fisheries biologist, these areas looked much more natural than the gully they replaced. In addition they reduced the erosion and sediment introduced into the stream.

SUMMARY

When doing any kind of rehabilitation in recreational management, it is helpful to restrict use on highly sensitive areas. Recreationists should be concentrated on areas that are more resistant to their disturbances. Areas that are most susceptible to compaction tend to be those with fine-textured soils because they hold moisture and are easily disturbed. Sites with sandy soils can also be affected, often through easy stream-bank sloughing. If possible, people should be moved to a site that is rockier. In developed areas, sites should be hardened by providing walkways and physical barriers. Protecting the soil resource also helps protect the water resource.

If the objective is to mimic natural systems, the changes made should be difficult for the untrained eye to see. Many of these suggestions are related to developed areas, but undeveloped areas can benefit from the same ideas. In undeveloped areas, the riparian area may be protected by restricting access, which can range from moving the road out of the

riparian area to fencing the area. Signs requesting that people camp away from the riparian area can be effective to some extent but must be accompanied by enforcement.

Many people want to use riparian ecosystems. They like to fish, to watch wildlife, and to relax next to the sound of rushing water. There is an opportunity to aesthetically develop recreational sites and still to have viable, quality riparian areas through education and through the judicious use of people management.

For those interested in more information on managing recreationists in riparian areas, e.g., meeting human needs, developing trails to direct people, and developing educational programs, references are listed below.

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